Eastern Gamagrass for Forage, Soil Improvement, and Buffer Strips

Project Activities

(This publication is a result of scientists at the ARS Beltsville Agricultural Research Center, the University of Maryland, NRCS and the Maryland Extension Service working on a grant project funded through the Fund for Rural America program.)

* On September 15 & 16, 1998 an Eastern Gamagrass Training Workshop was held at the USDA-ARS Beltsville Agricultural Research Center in Maryland for USDA-NRCS Grazing Land Specialists.
* *Eastern Gamagrass: From the Past to the Future*, a 17 minute video was produced by the Mid-Atlantic Interdisciplinary Resource Team, and distributed to NRCS field offices in the Mid-Atlantic area, USDA-ARS, and Maryland Cooperative Extension.
* Information on eastern gamagrass and the research project was made available at various USDA-ARS sustainable agriculture field days.
* A tension infiltrometer has been used to measure steady-flow infiltration in field and 3" soil cores from the gamagrass plots and adjacent fescue at Beltsville. This study was designed to compare infiltration rates under 3 year old eastern gamagrass and fescue. Measurements were made in February, May, and August and November. Preliminary analyses indicate higher infiltration under gamagrass in February but mixed results in May. This research is being done by Christopher Perrygo, a graduate student at the Biological Resources Engineering Department at the University of Maryland.

Back to Basics

Summarized from Agricultural Research/August 1997, p. 4-8 "Aerenchyma, Lifelines for Living Underwater", Don Comis.

Aerenchyma [pronounced air-ENK-a-ma], is tissue with air passages that enable roots of plants- rice, for example- to grow underwater. In aquatic plants, the corky tissue aids gas exchange and buoyancy.

Instead of a root tightly packed with an organized array of cells, roots with aerenchyma are spongy, with large holes formed by cells either pulling apart or disintegrating. These holes run longitudinally through the roots. They enable flooded roots to snorkel air from the abovewater parts of the plant.

Eastern Gamagrass roots contain aerenchyma, which is one of the reasons it is able to send its roots down at least 7 feet, through a claypan layer when it's sopping wet. These roots also allow for continued access to water in and below the claypan, enabling it to continue growing during prolonged droughts.

Research Reports

Abstracts of poster papers presented at the 1998 annual meeting of the Agronomy Society of America in Baltimore, MD, October 1998.

1. "Root Penetration, Yield, and Forage Quality of Eastern Gamagrass Grown on Acid-Compact Soils", D. Krizek, C. Foy, J. Reeves, III, A. Sadeghi, J. Ritchie, J. Davis.

Eastern gamagrass is a native, perennial, warm-season bunch-grass that is currently attracting widespread interest for use as a forage crop and for soil improvement. This study was conducted to examine its adaptability to acid-compact soils. Two year old eastern gamagrass plants at Beltsville grew well in acid (pH 4.5) compact soils with roots penetrating 1 to 2 m. In laboratory studies with acidic Tatum subsoil and in nutrient solution, eastern gamagrass was more tolerant to aluminum than other crops used. Yields in field plots were greater at pH 4.5 than at higher pH's. In contrast to barley, wheat, and snapbean, eastern gamagrass did not respond to lime at pH 5.0 to 5.8. Because of aerenchyma cells in their roots, eastern gamagrass plants were adapted to wet soils with roots living in and below the water table as evidenced by the oxidized soil surrounding the roots. Two year old eastern gamagrass was highly drought tolerant producing a maximum of 9021 kg/ha of dry forage in 1997 with an average of 5086 kg/ha for 14 plots in 1997 and 4677 kg/ha in 1998. Eastern gamagrass forage from this site was highly digestible (65-75% DMDIG), low in lignin (1-2.5% ADL), high in fiber (70-75% NDF) and moderate in protein (6-10%).

2. "Narrow Grass Hedges for Reducing Soil Loss in Agricultural Areas", J. Ritchie, W. D. Kemper, C. Foy, D. Krizek, J. Englert.

Soil erosion is a major concern in agricultural areas around the world. Narrow, stiff grass hedges have been used to slow runoff and reduce soil loss caused by concentrated flow erosion; however, few quantitative data are available on their effectiveness. This study was designed to measure the effectiveness of narrow, stiff grass hedges as a conservation tool for reducing soil loss from agricultural fields. Eastern gamagrass [*Tripsacum dactyloides* L.] and Miscanthus [*Miscanthus sinensis* Andress] were used to establish grass hedges on a contour, across concentrated flow erosion areas. Eastern gamagrass and Miscanthus grew rapidly and, within two years, formed dense hedges that slowed runoff and reduced soil loss from the field. Ground surveys made in 1991 and 1995 measured 4 to 12 cm of sediment deposited above the hedges. Estimates of erosion/deposition using $_{137}$Cs ranged from -25 (erosion) to +30 (deposition) t/ha/yr. Erosion/deposition patterns were related to the original topography with low areas having the greatest deposition. Narrow, stiff grass hedges can be an alternative conservation tool for reducing soil loss and dispersing runoff from areas of concentrated flow channels in fields.

Interesting Tidbits

Excerpt is from "The Southern Cultivator", Vol. 1 (8)- April 26, 1843, p. 60.

On establishing a stand of eastern gamagrass:
Now what would be the labor attending the seeding of an acre, the plants being grown? Not much more than planting an acre in corn. With two boys, ten years old, with the plants in baskets, to drop them in the furrows, 12 inches apart, and two men to cover with the hoe and press the earth with its back, we would agree to plant out an acre in a day, and when this would be done, we would indulge in the comfortable reflections, that we had perfected a work which would last for three-score years and ten; that both ourself and our children were secured in hay for our stock during our lives. Notwithstanding the immense yield of this grass- notwithstanding its long continuance- notwithstanding it is nutritive to and relished by stock of all kinds, such is the aversion of the great body of agriculturists to incurring any extra labor, that we fear it never will be successfully introduced. Again, we have heard the objection raised against it that it required to be cut too often; or, in other words, that it was too productive; for the objection resolves itself into this, let it be twisted as it may.

Project Participants

Initial contacts concerning the project may be directed to the following persons, however the list of participants is much longer:

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Gamagrass Roots

Dr. Errol G. Rhoden of the College of Agricultural, Environmental and Natural Sciences at Tuskegee University, Tuskegge, Alabama spent 4 weeks in August studying root distribution in gamagrass field plots at Beltsville, MD.

He collected soil and roots from the upper 18 inches of soil at the base of selected gamagrass plants. Bulk density of the soil increased with soil depth while pH decreased. There was a decrease in root weight with soil depth. In the upper six inches of the soil, root dry weight averaged 2.39 gm/L of soil. At the 6 to 12 inch depth, root dry weight was 0.56 gm/L of soil and at 12-18 inches depth was 0.54 gm/L of soil.

A series of greenhouse studies was also conducted. In one study, he cut back root systems of established plants by 1/4 or 1/2 (or left them intact) before transplanting the plants to larger containers to determine subsequent effects on shoot and root growth.

In another study, he divided established gamagrass plants into single shoots and pruned the root system back to 1 to 4 roots (each 5 cm long) to determine the minimum number of roots needed to propagate the plants clonally. Four different media were used. Initial studies have just been concluded and samples have been taken for biomass determination. Preliminary results indicate that gamagrass cuttings in Tatum soil had the highest rate of survival. However, these plants tended to have less growth and fewer tillers than those from other media. Cuttings placed in a peat-vermiculite mix had the greatest number of tillers while those in Turface produced the tallest shoots.

Keep an Eye Out

Watch for future technical updates on this project!

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